AMENDMENTS TO THE CLAIMS

1-45. **(Canceled)**

46. **(Withdrawn)** A method of controlling a prosthetic knee worn by an amputee using a controller which transitions between a plurality of states of biological gait including a first state generally corresponding to stance flexion, a second state generally corresponding to stance extension, a third state generally corresponding to knee break, a fourth state generally corresponding to swing flexion, and a fifth state generally corresponding to swing extension, said method comprising:

measuring sensory information and providing said sensory information to said controller for computation of axial force, extension moment, knee angle and velocity;

transitioning from said first state to said second state under condition C12 and said condition C12 being satisfied when said prosthetic knee achieves a predetermined extension velocity;

transitioning from said second state to said third state under condition C23 and said condition C23 being satisfied when said extension moment is below a first threshold;

transitioning from said third state to said fourth state under condition C34 and said condition C34 being satisfied when said axial force falls below a second threshold;

transitioning from said fourth state to said fifth state under condition C45 and said condition C45 being satisfied when said prosthetic knee begins to extend;

transitioning from said fifth state to said first state under condition C51 and said condition C51 being satisfied when said axial force climbs above a third threshold; and

controlling operation of said prosthetic knee in said states of biological gait by processing said sensory information to provide a controlled and variable resistance to flexion and/or extension.

47. **(Withdrawn)** The method of Claim 46, wherein said condition C23 is further satisfied when said prosthetic knee is at or close to full extension.

48. **(Withdrawn)** The method of Claim 47, wherein said condition C23 is further satisfied when said prosthetic knee has been substantially still for a predetermined time.

49. **(Withdrawn)** The method of Claim 46, wherein said method further comprises transitioning from said first state to said third state under condition C13 and said condition C13 is satisfied when said extension moment is below a fourth threshold.

50. **(Withdrawn)** The method of Claim 49, wherein said condition C13 is further satisfied when said prosthetic knee is at or close to full extension.

51. **(Withdrawn)** The method of Claim 50, wherein said condition C13 is further satisfied when said prosthetic knee has been substantially still for a predetermined time.

52. **(Withdrawn)** The method of Claim 46, wherein said method further comprises transitioning from said first state to said fourth state under condition C14 and said condition C14 is satisfied when said axial force falls below a fourth threshold.

53. **(Withdrawn)** The method of Claim 46, wherein said method further comprises transitioning from said second state to said first state under condition C21 and said condition C21 is satisfied when said prosthetic knee achieves a predetermined flexion velocity.

54. **(Withdrawn)** The method of Claim 46, wherein said method further comprises transitioning from said second state to said fourth state under condition C24 and said condition C24 is satisfied when said axial force falls below a fourth threshold

55. **(Withdrawn)** The method of Claim 46, wherein said method further comprises transitioning from said third state to said first state under condition C31 and said condition C31 is satisfied when said prosthetic knee has been in said third state for a predetermined time.

56. **(Withdrawn)** The method of Claim 46, wherein said method further comprises transitioning from said third state to said first state under condition C31 and said condition C31 is satisfied when extension moment is above a fourth threshold.

57. **(Withdrawn)** The method of Claim 56, wherein said condition C31 is further satisfied when said prosthetic knee is at or close to full extension.

58. **(Withdrawn)** The method of Claim 46, wherein said method further comprises transitioning from said fourth state to said first state under condition C41 and said condition C41 is satisfied when said axial force climbs above a fourth threshold.

59. **(Currently amended)** A method of controlling a prosthetic knee system, comprising:

measuring at least one characteristic of knee movement;

~~identifying a control state based at least partly on the at least one measured characteristic of knee movement;~~

calculating a damping value based at least partly on the at least one measured characteristic ~~control state~~; and

applying the damping value to control ~~the~~ resistance of a magnetorheological damper operating primarily in shear mode.

60. **(Currently amended)** The method of Claim 59, wherein the magnetorheological damper operating primarily in shear mode comprises a rotary magnetorheological damper operating primarily in shear mode.

61. **(Previously presented)** The method of Claim 59, wherein the measuring comprises receiving a value from a knee angle sensor.

62. **(Previously presented)** The method of Claim 59, wherein the measuring comprises receiving a value from a load sensor.

63. **(Previously presented)** The method of Claim 62, wherein receiving a value from the load sensor comprises receiving at least one value from a strain gauge.

64. **(Previously presented)** The method of Claim 59, wherein the calculating comprises adapting a damping parameter.

65. **(Currently amended)** A prosthetic knee system, comprising:

a magnetorheological damper operating primarily in shear mode;

at least one sensor configured to measure knee motion; and

a software system ~~configured to identify a control state based at least partly on the measure of knee motion and~~ configured to send a control signal to the damper based at least partly on the knee motion measured by the at least one sensor ~~control state~~.

66. **(Previously presented)** The system of Claim 65, wherein the magnetorheological damper comprises a rotary magnetorheological damper.

67. **(Previously presented)** The system of Claim 65, wherein the at least one sensor comprises a knee angle sensor.

68. **(Previously presented)** The system of Claim 65, wherein the at least one sensor comprises a load sensor.

69. **(Previously presented)** The system of Claim 68, wherein the load sensor comprises at least one strain gauge.

70. **(Previously presented)** The system of Claim 65, wherein the control signal comprises a current and wherein the damper is configured to vary resistance to rotation in response to the current.

71. **(New)** The method of Claim 59, further comprising identifying a control state based at least partly on the at least one measured characteristic of knee movement, and calculating a damping value based at least partly on the control state.

72. **(New)** The system of Claim 65 wherein the software system is configured to identify a control state based at least partly on the measure of knee motion and configured to send a control signal to the damper based at least partly on the control state.

73. **(New)** A method of controlling a prosthetic joint system, comprising:

measuring at least one characteristic of joint movement;

identifying a control state from a plurality of distinct, predetermined control states based at least partly on the at least one measured characteristic of joint movement;

calculating a damping value based at least partly on the control state; and

applying the damping value to control resistance of a magnetorheological damper.

74. **(New)** The method of Claim 73, wherein each of the predetermined control states corresponds to a phase of the gait.

75. **(New)** The method of Claim 73, wherein the prosthetic joint system comprises a prosthetic knee.

76. **(New)** The method of Claim 75, wherein the magnetorheological damper operates primarily in shear mode.

77. **(New)** The method of Claim 73, wherein the measuring comprises receiving a value from an angle sensor.

78. **(New)** The method of Claim 73, wherein the measuring comprises receiving a value from a load sensor.

79. **(New)** The method of Claim 73, wherein the calculating comprises adapting a damping parameter.

80. **(New)** A prosthetic joint system, comprising:

a magnetorheological damper;

at least one sensor configured to measure joint motion; and

a software system configured to identify a control state from a plurality of distinct, predetermined control states based at least partly on the measure of joint motion and configured to send a control signal to the damper based at least partly on the control state.

81. **(New)** The system of Claim 80, wherein each of the predetermined control states corresponds to a phase of the gait.

82. **(New)** The system of Claim 80, comprising a prosthetic knee.

83. **(New)** The system of Claim 80, wherein the magnetorheological damper operates primarily in shear mode.

84. **(New)** The system of Claim 80, wherein the at least one sensor comprises an angle sensor.

85. **(New)** The system of Claim 80, wherein the at least one sensor comprises a load sensor.

86. **(New)** The system of Claim 80, wherein the control signal comprises a current and wherein the damper is configured to vary resistance to rotation in response to the current.

87. **(New)** A method of controlling a prosthetic knee worn by an amputee comprising a magnetorheological damper using a controller which transitions between a plurality of states of biological gait including a first state generally corresponding to stance flexion, a second state generally corresponding to stance extension, a third state generally corresponding to knee break, a fourth state generally corresponding to swing flexion, and a fifth state generally corresponding to swing extension, said method comprising:

measuring sensory information and providing said sensory information to said controller for computation of axial force, extension moment, knee angle and velocity;

transitioning from said first state to said second state under condition C12 and said condition C12 being satisfied when said prosthetic knee achieves a predetermined extension velocity;

transitioning from said second state to said third state under condition C23 and said condition C23 being satisfied when said extension moment is below a first threshold;

transitioning from said third state to said fourth state under condition C34 and said condition C34 being satisfied when said axial force falls below a second threshold;

transitioning from said fourth state to said fifth state under condition C45 and said condition C45 being satisfied when said prosthetic knee begins to extend;

transitioning from said fifth state to said first state under condition C51 and said condition C51 being satisfied when said axial force climbs above a third threshold; and

controlling operation of said prosthetic knee in said states of biological gait by processing said sensory information to provide a controlled and variable resistance to flexion and/or extension.

88. **(New)** The method of Claim 87, wherein said condition C23 is further satisfied when said prosthetic knee is at or close to full extension.

89. **(New)** The method of Claim 88, wherein said condition C23 is further satisfied when said prosthetic knee has been substantially still for a predetermined time.

90. **(New)** The method of Claim 87, wherein said method further comprises transitioning from said first state to said third state under condition C13 and said condition C13 is satisfied when said extension moment is below a fourth threshold.

91. **(New)** The method of Claim 90, wherein said condition C13 is further satisfied when said prosthetic knee is at or close to full extension.

92. **(New)** The method of Claim 91, wherein said condition C13 is further satisfied when said prosthetic knee has been substantially still for a predetermined time.

93. **(New)** The method of Claim 87, wherein said method further comprises transitioning from said first state to said fourth state under condition C14 and said condition C14 is satisfied when said axial force falls below a fourth threshold.

94. **(New)** The method of Claim 87, wherein said method further comprises transitioning from said second state to said first state under condition C21 and said condition C21 is satisfied when said prosthetic knee achieves a predetermined flexion velocity.

95. **(New)** The method of Claim 87, wherein said method further comprises transitioning from said second state to said fourth state under condition C24 and said condition C24 is satisfied when said axial force falls below a fourth threshold

96. **(New)** The method of Claim 87, wherein said method further comprises transitioning from said third state to said first state under condition C31 and said condition C31 is satisfied when said prosthetic knee has been in said third state for a predetermined time.

97. **(New)** The method of Claim 87, wherein said method further comprises transitioning from said third state to said first state under condition C31 and said condition C31 is satisfied when extension moment is above a fourth threshold.

98. **(New)** The method of Claim 97, wherein said condition C31 is further satisfied when said prosthetic knee is at or close to full extension.

99. **(New)** The method of Claim 87, wherein said method further comprises transitioning from said fourth state to said first state under condition C41 and said condition C41 is satisfied when said axial force climbs above a fourth threshold.